

As established throughout Applicants' disclosure, determining a value of a polynomial provides real-world utility. For example, polynomials and rational functions are used to model the rate of air flow over an airfoil surface (see paragraph [0002]). Other utilities include using polynomials for determining frequency response characteristics of electrical systems and for mathematically modeling and predicting spatial coordinates of impact of a projectile being released from an airplane (see paragraph [0119]). Thus, the claimed invention meets the utility requirement of 35 U.S.C. § 101.

Applicants also note that the claimed invention is not merely directed to using a particular equation. Instead, the claim invention is directed to a novel method (and machine implementing the method) of how to more efficiently solve the equation. As noted in the background of the invention, many computer-implemented techniques have been used to try to solve these types of equations. However, these techniques either produce unacceptable large deviations between a computer binary representation and its theoretical numerical value or require a significant increase in processing time and/or hardware (see paragraph [0003]). The claimed invention is directed to solving these types of equations with improved deviation (see paragraphs [0094] - [0096]).

Notwithstanding Applicants' clear assertion of utility in the specification, the Examiner has failed to explain why one of ordinary skill in the art would reasonably doubt the asserted utility, as required by M.P.E.P. § 2164.07. Thus, the Examiner has failed to meet all the requirements of a rejection under the first paragraph of 35 U.S.C. §

112 for lack of utility. Therefore, Applicants respectfully solicit withdrawal of the imposed rejection of claims 1-44 under the first paragraph of 35 U.S.C. § 112.

CLAIMS 12, 14, AND 34 ARE REJECTED UNDER THE SECOND PARAGRAPH OF 35 U.S.C. § 112

On page 2 of the Office Action, the Examiner asserted that the term "adapting" renders the claims indefinite. For support, the Examiner also referred to M.P.E.P. § 2173.05(d). This rejection is respectfully traversed.

The Examiner appears to have confused the term "adapting" with the phrases "adapted for" or "adapted to." As discussed in M.P.E.P. § 2106, the phrases "adapted for" and "adapted to," in addition to other phrases such as "whereby," may raise a question as to the limiting effect of the language in the claim. However, the transitive sense of the word "adapt" (i.e., "adapting") means "to make fit (as for a specific or new use of situation) often by modification" (see Merriam-Webster Online Dictionary, www.m-w.com), which is very different from the phrases discussed in M.P.E.P. § 2106. Therefore, when the claims recite "adapting said input data . . . , " one skilled in the art would recognize that this phrase is read as stating that the input data is being adapted to a specific or new use.

Applicants' position, therefore, is that one having ordinary skill in the art would have no difficulty understanding the scope of claims 12, 14, and 34, particularly when

reasonably interpreted in light of the written description of the specification. Thus, the imposed rejection of claims 12, 14, and 34 under the second paragraph of 35 U.S.C. § 112 have been overcome and, hence, Applicants respectfully solicit withdrawal thereof.

CLAIMS 1-44 ARE REJECTED UNDER 35 U.S.C. § 101

On pages 2-3 of the Office Action, the Examiner asserted that the claimed invention, as recited in claims 1-44, is directed to non-statutory subject matter. This rejection is respectfully traversed.

35 U.S.C. § 101 states the following:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition, or any new and useful improvement thereof, may obtain a patent therefore, subject to the conditions and requirements of this title.

It is well established law that there was not intent by Congress to place any restrictions on the subject matter for which a patent may be obtained beyond those specifically recited in 35 U.S.C. § 101. In fact, the Supreme Court has acknowledged that Congress intended 35 U.S.C. § 101 to extend to "anything under the sun that is made by man."¹ The Supreme Court has identified three categories of subject matter that are unpatentable: (a) laws of nature; (b) natural phenomena, and (c) abstract ideas.² The Examiner has not alleged that the claimed invention is directed to laws of nature or a

¹ Diamond v. Chakrabarty, 447 U.S. 303, 309 (1980); see also Diamond v. Diehr, 450 U.S. 175, 182 (1981).

² See Diehr, 450 U.S. 175, *passim*; Parker v. Flook, 437 U.S. 584 (1978); Gottschalk v. Benson, 409 U.S. 63 (1972).

natural phenomena; and therefore, there is no need to further consider those categories of unpatentable subject matter.

Instead, the Examiner has alleged that the claimed invention, as recited in claims 1-44 "cite mere mathematical equations." Applicant, however, respectfully disagrees with the Examiner's conclusion. The courts have stated that, until reduced to some type of practical application, (i.e., "a useful, concrete and tangible result"), certain types of mathematical subject matter, standing alone, represent nothing more than abstract ideas.³ In State Street Bank and Trust Company v. Signature Financial Group, Inc.,⁴ the court elaborated on the mathematical algorithm exception to patentable subject matter by stating:

Unpatentable mathematical algorithms are identifiable by showing they are merely abstract ideas constituting disembodied concepts or truths that are not "useful." From a practical standpoint, this means that to be patentable an algorithm must be applied in a "useful" way.

The court in State Street then set forth the criteria for establishing statutory subject matter under 35 U.S.C. § 101 as follows:

The question of whether a claim encompasses statutory subject matter should not focus on which of the four categories of subject matter a claim is directed to — process, machine, manufacture, or composition of matter—but rather on the essential characteristics of the subject matter, in particular, its practical utility. Section 101 specifies that statutory subject matter must also satisfy the other "conditions and requirements" of Title 35, including novelty, nonobviousness, and adequacy of disclosure and notice. See In re Warmerdam, 33 F.3d 1354, 1359, 31 USPQ2d 1754, 1757-58 (Fed. Cir. 1994). For purpose of our analysis, as noted above, claim 1 is directed to a machine programmed with the Hub and Spoke software and admittedly produces a "useful, concrete, and tangible result." Alappat, 33 F.3d at 1544, 31 USPQ2d at 1557. This renders it statutory subject matter, even if the useful result is expressed in numbers, such as price, profit, percentage, cost, or loss.

³ In re Alappat, 33 F.3d 1526, 1544, 31 USPQ2d 1545, 1557 (Fed. Cir. 1994) (in banc).

⁴ 149 F.3d 1368, 47 USPQ2d 1596 (Fed Cir. 1998).

Thus, as articulated above, the test for determining whether subject matter is patentable under 35 U.S.C. § 101 involves deciding if the subject matter produces a "useful, concrete, and tangible result." Furthermore, the law states that this result can be "expressed in numbers." Independent claim 1 recites, in part, presenting the following number: "value of the first polynomial $p(x)$ representing said property of the mathematically modelled physical system." Therefore, claim 1 is directed to producing a concrete and tangible result (i.e., a value of a first polynomial) that can be used to represent a property of a mathematically modeled physical system.

Applicants note that the Examiner cited In re Schrader⁵ in support of the Examiner's argument that the claims cite mere mathematical equations with no post-solution activity. The following are direct quotes from In re Schrader:

Arrhythmia is not to the contrary. The claims in *Arrhythmia* involved the manipulation of electrical signals and data representative of human cardiac activity; it was held that they recited patentable subject matter. 958 F.2d at 1053, 22 USPQ2d at 1033. For purposes of Section 101, the claims were indistinguishable from the claims involving the manipulation of data representing CAT scan images held patentable in *In re Abele*, 684 F.2d 902, 214 USPQ 682 (CCPA 1982); or the claims involving the manipulation of signals representative of reflected seismic energy held patentable in *In re Taner*, 681 F.2d 787, 214 USPQ 678 (CCPA 1982).

These claims all involved the transformation or conversion of subject matter representative of or constituting *physical activity or objects*. In *Arrhythmia*, it was electrocardiograph signals representative of human cardiac activity; in *Abele*, it was X-ray attenuation data representative of CAT scan images of physical objects; and in *Taner*, it was seismic reflection signals representative of discontinuities below the earth's surface. Schrader's claims, except for incidental changes to a "record," do not reflect any transformation or conversion of subject matter representative of or constituting *physical activity or objects*. (emphasis in original)

The Examiner is also directed to footnote 9 of In re Schrader, in which the Court states:

⁵ 22 F. 3rd at 290, 294-295, 30 USPQ2d 1455, 1454-1459 (Fed. Cir. 1994).

CLAIMS 1-44 ARE REJECTED UNDER 35 U.S.C. § 102 AS BEING ANTICIPATED BY
FORSYTHE ET AL. (HEREINAFTER FORSYTHE)

On page 3 of the Office Action, the Examiner asserted that Forsythe discloses the claimed invention. This rejection is respectfully traversed.

The Examiner's statement of the rejection is reproduced in its entirety below:

Forsythe et al., teaches computing a numerical value of a polynomial (by applicant's own admission, specification: pg. 1 Background of the Present Invention).

The factual determination of anticipation under 35 U.S.C. § 102 requires the identical disclosure of each element of a claimed invention in a single reference. As part of this analysis, the Examiner must (a) identify the elements of the claims, (b) determine the meaning of the elements in light of the specification and prosecution history, and (c) identify corresponding elements disclosed in the allegedly anticipating reference. That burden has not been discharged. Moreover, the Examiner has failed to clearly designate the teachings in Forsythe. In this regard, the Examiner's rejection under 35 U.S.C. § 102 also fails to comply with 37 C.F.R. § 1.104(c).⁶

By failing to identify the elements of the claims; construe a meaning for these elements; and identify where these elements are disclosed by the applied reference, the

⁶ 37 C.F.R. § 1.104(c) provides:

In rejecting claims for want of novelty or for obviousness, the examiner must cite the best references at his or her command. When a reference is complex or shows or describes inventions other than that claimed by the applicant, the particular part relied on must be designated as nearly as practicable. The pertinence of each reference, if not apparent, must be clearly explained and each rejected claim specified.

Examiner has forced Applicants to engage in mind reading to determine how the Examiner is interpreting the elements of the claims and what features the Examiner believes identically discloses the claimed invention. Essentially, the Examiner is placing the burden on Applicants to prove that Forsythe does not disclose the claimed elements based upon Applicants' interpretation of the claims and Applicants' comparison of the claims with the applied prior art. This shifting of the Examiner's burden to the Applicants to establish patentability, however, is premature since the Examiner has still not discharged his burden of providing a prima facie case of anticipation.

In the unpublished opinion of Ex parte Pryor⁷, the Board of Patent Appeals and Interferences recognized the necessity for an Examiner to supply sufficient information to establish a prima facie case of anticipation. Specifically, the Board wrote:

At the outset, we note the examiner has been of little help in particularly explaining the rejections on appeal. A mere statement that claims stand rejected "as being clearly anticipated by" a particular reference, without any further rationale, such as pointing out corresponding elements between the instant claims and the applied reference, fails to clearly make out a prima facie case of anticipation. (emphasis in original)

Furthermore, it is improper for the Examiner to distill all of Applicants' 44 claims into a single concept (i.e., computing a numerical value of a polynomial) and assert that this concept is disclosed.

For the reasons stated above, Applicants submit that the Examiner has failed to establish a prima facie case of anticipation within the meaning of 35 U.S.C. § 102. Thus,

⁷ Appeal No. 1997-2981.

Applicants respectfully solicit withdrawal of the rejection of claims 1-44 under 35 U.S.C. § 102 for anticipation based upon Forsythe.

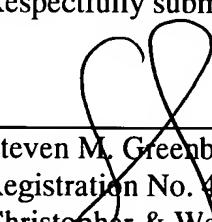
Applicants have made every effort to present claims which distinguish over the prior art, and it is believed that all claims are in condition for allowance. However, Applicants invite the Examiner to call the undersigned if it is believed that a telephonic interview would expedite the prosecution of the application to an allowance.

Accordingly, and in view of the foregoing remarks, Applicants hereby respectfully request reconsideration and prompt allowance of the pending claims.

To the extent necessary, a petition for an extension of time under 37 C.F.R. § 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 09-0461, and please credit any excess fees to such deposit account.

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Respectfully submitted,



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